



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**23.07.2003 Bulletin 2003/30**

(51) Int Cl.7: **G01C 21/20**, G01C 21/26,  
G06F 9/38, G06F 12/00,  
G06F 17/30, G11B 27/00,  
G06T 17/50, G09B 29/00

(43) Date of publication A2:  
**29.09.1999 Bulletin 1999/39**

(21) Application number: **99302263.1**

(22) Date of filing: **24.03.1999**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU**  
**MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

- **Jaugilas, John**  
**Lombard, Illinois 60148 (US)**
- **Natesan, Senthil**  
**Carol Stream, Illinois 60188 (US)**
- **Lampert, David S.**  
**Highland Park, Illinois 60035 (US)**
- **Nash, Alex**  
**Gurnee, Illinois 60031 (US)**

(30) Priority: **27.03.1998 US 49747**

(71) Applicant: **Navigation Technologies Corporation**  
**Chicago, Illinois 60654 (US)**

(74) Representative:  
**McLeish, Nicholas Alistair Maxwell et al**  
**Boult Wade Tennant**  
**Verulam Gardens**  
**70 Gray's Inn Road**  
**London WC1X 8BT (GB)**

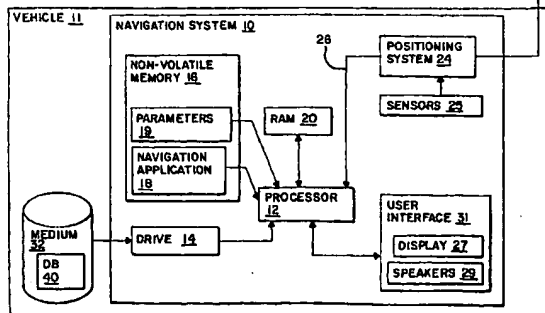
(72) Inventors:  
• **Crowley, Paul**  
**Buffalo Grove, Illinois 60089 (US)**

(54) **Memory management for navigation system**

(57) A method and system for managing memory resources in a system used in conjunction with a navigation application program that accesses geographic data. The geographic data are comprised of a plurality of data records. The plurality of data records are organized into parcels, each of which contains a portion of the plurality of data records, such that the data records in each portion of the plurality of data records that forms each parcel are accessed together. One or more buffers each that forms a contiguous portion of the memory of the navigation system is provided as a cache to store a plurality of parcels. One or more data structures located outside the contiguous portion of memory identify the parcels of data stored in the cache and the locations in the cache at which the parcels are stored. The one or more data structures located outside the contiguous portion of memory in which the parcels are cached are used to manage the parcel cache to use it efficiently. These one or more data structures located outside the contiguous memory in which the parcels are cached are also used to defragment the parcel cache.

gation system is provided as a cache to store a plurality of parcels. One or more data structures located outside the contiguous portion of memory identify the parcels of data stored in the cache and the locations in the cache at which the parcels are stored. The one or more data structures located outside the contiguous portion of memory in which the parcels are cached are used to manage the parcel cache to use it efficiently. These one or more data structures located outside the contiguous memory in which the parcels are cached are also used to defragment the parcel cache.

FIG. 1





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 2263

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.8)
Y	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 08, 30 June 1998 (1998-06-30) & JP 10 078901 A (SUMITOMO ELECTRIC IND LTD), 24 March 1998 (1998-03-24) * abstract *	1-24, 29	G01C21/20 G01C21/26 G06F9/38 G06F12/00 G06F17/30 G11B27/00 G06T17/50 G09B29/00
Y	PATENT ABSTRACTS OF JAPAN vol. 017, no. 677 (P-1659), 13 December 1993 (1993-12-13) & JP 05 225059 A (HOKKAIDO NIPPON DENKI SOFTWARE KK), 3 September 1993 (1993-09-03) * abstract *	1-24, 28, 29	
Y	US 4 631 668 A (IZUMI CHIKAHIKO ET AL) 23 December 1986 (1986-12-23) * column 1, line 67 - column 2, line 6 * * column 2, line 15 - line 20 * * column 2, line 41 - column 4, line 37 * * column 4, line 63 - column 5, line 24 * * column 5, line 61 - column 6, line 9 * * figures 1-5 *	25-28	
Y	EP 0 280 795 A (PHILIPS NV) 7 September 1988 (1988-09-07) * the whole document *	25-27	
A	US 4 937 572 A (ITO KENZO ET AL) 26 June 1990 (1990-06-26) * the whole document *	25-28	
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 11, 28 November 1997 (1997-11-28) & JP 09 179492 A (TOYOTA MOTOR CORP), 11 July 1997 (1997-07-11) * abstract *	1	
--- -/--			
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 April 2003	Examiner Barel-Faucheux, C
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 (03-02) (P04021)



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 30 2263

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,A	US 4 888 698 A (DRIESSEN LEONARDUS M H E ET AL) 19 December 1989 (1989-12-19) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.8)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 Apr11 2003	Examiner Barel-Faucheux, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04001)



European Patent  
Office

Application Number  
EP 99 30 2263

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION :**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent  
Office

**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
EP 99 30 2263

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-24,29

Memory managing system for a navigation system using a cache.

2. Claims: 25-28

Method of organizing a requested parcel queue in a navigation system using a geographic database having a parcel structure.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 30 2263

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-04-2003

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 10078901	A	24-03-1998	JP	3042415 B2	15-05-2000
JP 05225059	A	03-09-1993	NONE		
US 4631668	A	23-12-1986	JP	58133696 A	09-08-1983
EP 0280795	A	07-09-1988	NL	8602654 A	16-05-1988
			CA	1292081 A1	12-11-1991
			DE	3782157 D1	12-11-1992
			DE	3782157 T2	29-04-1993
			EP	0280795 A1	07-09-1988
			JP	2697830 B2	14-01-1998
			JP	63111551 A	16-05-1988
			US	4888698 A	19-12-1989
US 4937572	A	26-06-1990	JP	61250671 A	07-11-1986
			CA	1250354 A1	21-02-1989
JP 09179492	A	11-07-1997	NONE		
US 4888698	A	19-12-1989	NL	8602654 A	16-05-1988
			CA	1292081 A1	12-11-1991
			DE	3782157 D1	12-11-1992
			DE	3782157 T2	29-04-1993
			EP	0280795 A1	07-09-1988
			JP	2697830 B2	14-01-1998
			JP	63111551 A	16-05-1988

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82